



503.38382X00

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant(s): S. ARATANI, et al
Serial No.: 09/532,740 ✓
Filed: March 22, 2000
For: LIQUID CRYSTAL DISPLAY APPARATUS
Group: 2674
Examiner: A. Abdulsalam

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RESPONSE

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Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

July 21, 2003

Sir:

The following remarks are respectfully submitted in connection with the above-identified application in response to the Office Action dated March 19, 2003.

The rejection of claims 1-10 under 35 U.S.C. 103(a) as being unpatentable over Hirai et al (USPN 6,122,021) in view of Johnson et al (USPN 6,252,638) is traversed, and reconsideration and withdrawal of the rejection are respectfully requested.

Applicants note that the present invention is directed to a liquid crystal display apparatus which can smoothly display dynamic images, i.e., moving images, without obscurity. As described in the specification of this application, since a human perceives dynamic or moving images by averaging the displayed images, the perceived images are not focused and a technique is disclosed in the prior art in which, after the whole or entire display panel has been scanned, a lighting device is

turned on to eliminate the lack of focus due to the above-noted averaging effect. However, since the lighting device is turned on after the whole or entire liquid crystal panel has been scanned, and the response of the whole or entire liquid crystal has been completed, the scanning period and the response time must be significantly shortened, and since the lighting period of the lighting device is short, the light strength must be increased in order to achieve the same brightness as that obtained in a conventional liquid crystal display method, which results in decrease of the lifetime of the lighting device. The present invention as recited in independent claims 1 and 6 and as illustrated in Figs. 1 and 5 of the drawings of this application, there is provided a plurality of light sources in the form of lamps 51 which are arranged for each of plural regions (a, b and c), for example, and a control unit is provided for controlling ON and OFF states of a light source for each of plural regions into which the lighting device is divided, based on a display response of the liquid crystal display unit. Independent claim 2 recites the feature that the lighting device includes a light-adjustment unit for adjusting a quantity of light from the light source, which is transmitted to each plural region into which the lighting device is divided, and a control unit for controlling each light-adjustment unit based on a display response of the liquid crystal display unit.

More particularly, Figs. 6-8 of the drawings of this application show the control as effected by the present invention, wherein the lighting device which is divided into three regions a, b and c has the lamps 51 in each region lighted after the scanning of each region, and the response in the liquid crystals corresponding to that region have been completed, as described at page 10, lines 8-16 of the specification, wherein the region a, b and c are lighted after 12 ms, 15 ms and 18 ms, respectively,

for 4.6 ms after the start of the scanning of the portion corresponding to each region, of the liquid crystal display unit 2. As shown in Fig. 8, the transmittance is the average value of the transmittance values of the three regions in the liquid crystal display unit 2 and the lamps 51 in each region of the lighting device 7 are controlled so as to be lighted after the transmittance of the liquid crystal display unit 2 has reached the saturation state. Thus, as described at page 11, lines 1-13 of the specification, with such conditions, even if dynamic images obtained by moving a static image at a visual-angle speed of 10°/s are displayed, there is no perceptible obscurity in the dynamic images. As such, in accordance with the present invention as recited in each of independent claims 1, 2 and 6 and the dependent claims, control of the light source is effected, based on a display response of the liquid crystal display unit, whereby advantages as described in the specification enabling improvement in the quality of moving images, and additionally, extension of the life of the light source can be achieved.

In setting forth the rejection, the Examiner recognizes that "Hirai does not disclose a lighting device that includes a plurality of light sources". Applicants submit that Hirai also does not disclose controlling of ON and OFF states of the light source for each of plural regions into which the lighting device is divided based on a display response of the liquid crystal display unit or adjusting a quantity of light from the light source, which is transmitted to each of plural regions into which the lighting device is divided and controlling each light-adjustment unit based on a display response of the liquid crystal display unit, as recited in independent claims 1 and 2, nor effecting control when dynamic images are displayed, as recited in independent claim 6, for example. Furthermore, while the Examiner contends that Hirai teaches the

responding property of the display and establishes a relationship between the property at ON and OFF states of the display, referring to col. 13, lines 59-67 and col. 14, lines 1-9, applicants submit that this portion of Hirai only describes differences in providing a 2-state display with or without gray scale display, and recognizing that different voltages are applied and the response may be greater or slower in the static two-state display. Thus, Hirai et al is not directed to a dynamic image display nor does Hirai et al provide a disclosure or teaching of control of a light source or quantity of light for each plural regions as recited in each of independent claims 1, 2 and 6, based on a display response with the control effecting the switching on and off of the light source as recited. Thus, applicants submit that the Examiner has mischaracterized Hirai et al in relation to the claimed invention and in addition to Hirai et al failing to disclose a lighting device as claimed, fails to disclose or teach the control of a lighting device for plural regions based upon a display response and, in particular, the turning on and off of a light source in the manner defined. Accordingly, applicants submit that each of independent claims 1, 2 and 6 and the dependent claims patentably distinguish over Hirai et al in the sense of 35 U.S.C. 103 and should be considered allowable thereover.

The Examiner recognizing the deficiency of Hirai et al, contends that Johnson teaches a light device which includes a plurality of light sources and that it "would have been obvious to one having skill in the art at the time the invention was made to modify Hirai's display system to include Johnson's lighting device with a plurality of light sources. One would have been motivated in view of the suggestion in Johnson et al that a lighting device is equivalent to the desired lighting device. The use of a lighting device helps control color signals in display devices." (emphasis added)

Applicants submit that this position by the Examiner represents a hindsight reconstruction attempt in complete disregard of the teachings of the individual references, utilizing the principle of "obvious to try" which is not the standard of 35 U.S.C. 103. See In re Fine, 5 USPQ 1596 (Fed. Cir. 1988).

Irrespective of the contentions by the Examiner, applicants submit that Johnson et al fails to overcome the deficiencies of Hirai et al, as pointed out above. More particularly, applicants submit that Johnson et al fails to disclose or teach a control unit operating in the manner defined in claims 1, 2 and 6 and the dependent claims, wherein the control is effected for dynamic image display based on a display response in which the light source is made to be switched on/off based on the display response. As such, applicants submit that the proposed combination of Hirai et al and Johnson et al fail to provide the claimed features as set forth in independent claims 1, 2 and 6 and the dependent claims thereof in the sense of 35 U.S.C. 103, and all claims should be considered allowable thereover.

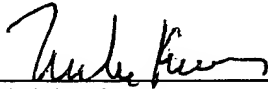
With respect to the dependent claims, applicants submit that the dependent claims recite additional features when considered in conjunction with the parent claims further distinguish over this cited art in the sense of 35 U.S.C. 103, such that all claims should be considered allowable thereover.

In view of the above remarks, applicants submit that all claims, i.e. claims 1-10, patentably distinguish over the cited art in the sense of 35 U.S.C. 103, and should be considered allowable thereover. Accordingly, issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing

of this paper, including extension of time fees, to Deposit Account No. 01-2135
(503.38382X00) and please credit any excess fees to such deposit account.

Respectfully submitted,



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